DIE CASTING ENGINEER

SEPTEMBER, 1959

THE SOCIETY OF DIE CASTING ENGINEERS, INC.
1966 JAMES COUZENS HIGHWAY
DETROIT 48, MICHIGAN

NEW PLATING METHOD

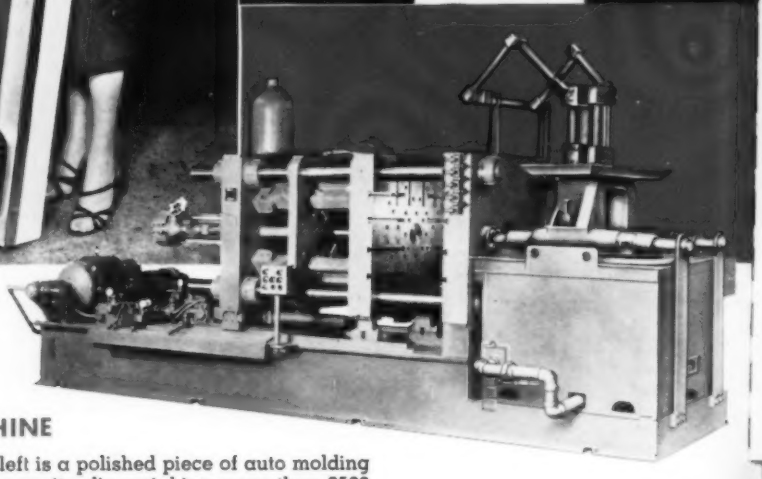
Look for . . .

- ***DUPLEX CHROMIUM***
  Bright chromium plate with increased corrosion resistance.—Page 9

- ***SELECTION OF DIE CASTING LUBRICANTS, Part 2***
  Increase production and die life.—Page 15

PUBLICATION OF THE SOCIETY OF DIE CASTING ENGINEERS

HOLLAND DIE CASTING COMPANY, with skill and experience, produces extraordinary castings on B&T DIE CASTING MACHINES!



Joe: Better get the dope on these B&T machines Al.

CAST ON A 750-TON B&T MACHINE

1 The single finished part in the photo at the left is a polished piece of auto molding trim 64 inches long. It is produced in a two-cavity die weighing more than 8500 lbs. and measuring 84 inches in length. Weight of shot is 10½ lbs. Platens on the B&T machine are 48 inches wide and thus the 84 inch long die actually extends 1½ feet beyond each side of the machine. In successfully holding and casting this long piece the B&T 4-toggle lock-up system forcefully demonstrates its remarkable efficiency.

CAST ON A 750-TON B&T MACHINE

2 This intricate casting is the console of an automatic washing machine. The shot required weighs 14 lbs. Six 5 inch mounting studs in the back of the part are cast independently of the wall. The console has intricate coring and the instrument cluster is chrome plated and painted . . . a difficult casting to produce.

CAST ON A 600-TON B&T DIE CASTING MACHINE

3 This triangular-shaped casting is a chrome plated gravel guard for one of America's finest cars. It is made by the Holland Die Casting Company in a single cavity die weighing more than 6,000 lbs. Weight of the shot is 6½ lbs. Finish obtained is excellent. An outstanding production job for a 600-ton machine and indicative of the remarkable results obtainable with all B&T machines. Holland Die Casting Company's facilities include 12 B&T die casting machines in capacities up to 1,000 tons.

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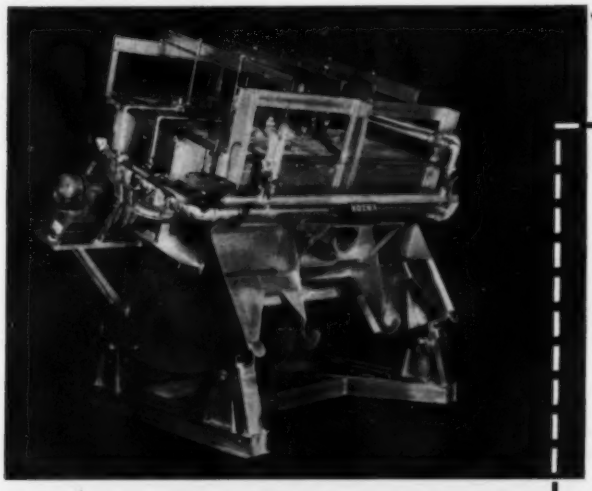
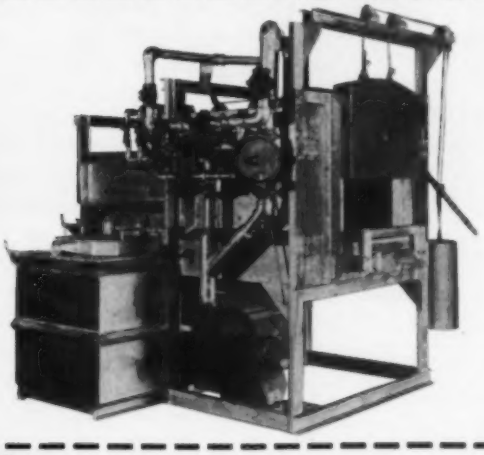
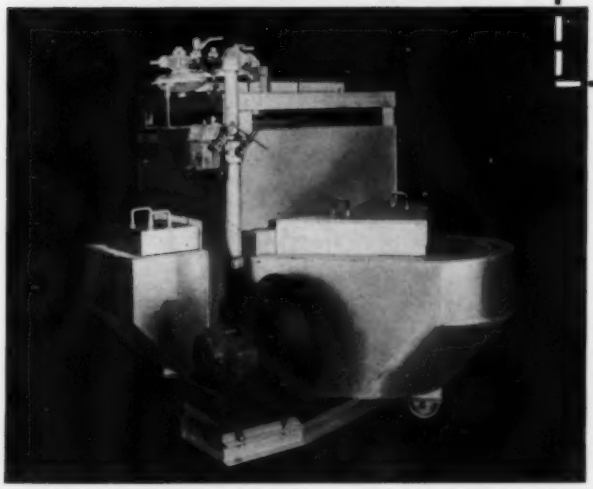


KOZMA MODEL RT TILTING REVERBERATORY FURNACES feature well-type charging apertures for immersion melting of ingots. Tilt through a 20 degree arc to charge integrally-hung ladle. Ladle can be transferred by fork lift truck. No overhead equipment is required. Capacities from 500 to 2,000 lbs. per hour.





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This KOZMA MODEL RH HOLDING FURNACE was specially designed for use with aluminum vacuum die casting machines. Roller bearing wheels and a unique dipwell permit installation of the furnace as an integral part of the die casting machine. Kozma Model RH Holding Furnaces have been specified by a well-known manufacturer of die casting machines and by a leading producer of aluminum for use where highest quality metal is a "must". Bath capacities and dipwell design to meet your requirements.

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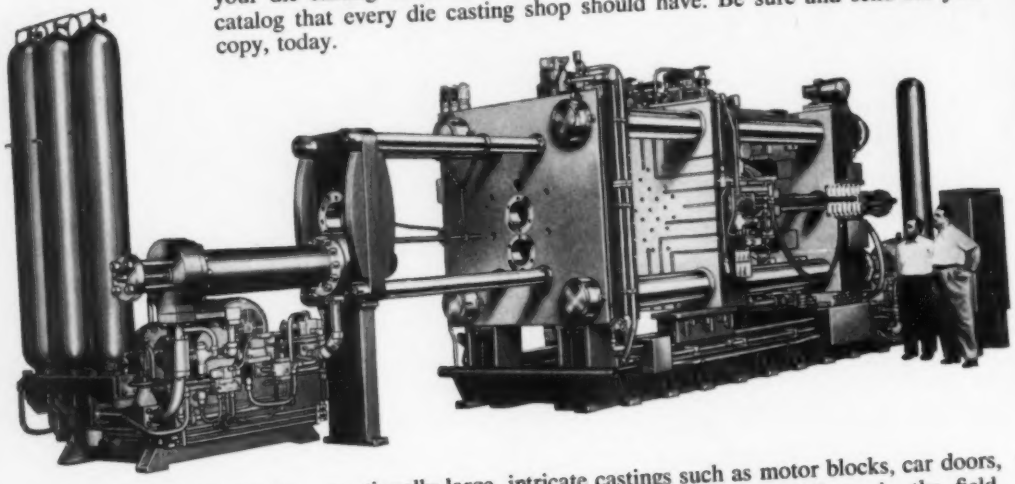
Whether your requirements call for precision parts of a few ounces in weight or a massive casting of 85 pounds, there's a Cast-Master to fit the job. It's a line that sparkles with a range of models, each with outstanding features for your die casting needs. The chart below is reproduced from the brand new catalog that every die casting shop should have. Be sure and send for your copy, today.



MODEL 60A Cast-Master for exceptionally large, intricate castings such as motor blocks, car doors, large housings, etc. This huge 2000 ton Cast-Master has proved its usefulness in the field.

THE CAST-MASTER LINE FOR PRECISION DIE CASTINGS

PLUNGER GOOSENECK TYPE: *Zinc, Lead and Tin*

MODEL	7Z	9Z	10Z	15Z	20Z	30Z	40Z	50Z
Locking Pressure (Tons)	100	200	300	400	500	600	800	1000
Tie Bar Centers (In.) Ver.	16	19½	23	26	30½	32½	37	46
Tie Bar Centers (In.) Hor.	16	19½	23	26	28½	32½	40	46
Tie Bar Diameter (In.)	2½	3½	4	5	5½	6	7	8
Space Between Tie Bars (In.)	13½x 13½	16x 16	19x 19	21x 21	23 Hor. 25 Ver.	26½x 26½	33 Hor. 30 Ver.	38x38
Die Mounting Plates (In.)	3½x 21½x 21½	4½x 26x 26	5x 32x 32	6x 36x 36	7x 38x 40	8x 48x 44	9x 52x 54	Stat. 12x60x60 Mov. 10x60x60
Die Thickness (In.) Min.	4	6	8	8	8	12	20	20
Die Thickness (In.) Max.	19	24	24	28	36	38	38	44
Die Stroke (In.) (Adjustable) Min.	4	6	6	8	9	12	18	18
Die Stroke (In.) (Adjustable) Max.	8	10	10	12	15	18	24	24
Injection Cylinder Dia. (In.)	2½	3⅛	3⅝	4⅛	4⅛	4⅝	4⅝	6⅛
Injection Cylinder Stroke (In.)	6½	7¼	7¼	7¼	7¼	10	10	14
Metal Pot Capacity (Lbs.)	800	1000	1000	1000	1000	2000	2000	3000

COLD CHAMBER TYPE: *Aluminum, Brass and Magnesium*

7A	9A	10A	15A	20A	30A	40A	50A	60A
100	200	300	400	500	600	800	1000	2000
16	19½	23	26	30½	32½	37	46	62
16	19½	23	26	28½	32½	40	46	62
2½	3½	4	5	5½	6	7	8	11
13½x 13½	16x 16	19x 19	21x 21	23 Hor. 25 Ver.	26½x 26½	33 Hor. 30 Ver.	38x38	51x 51
3½x 21½x 21½	4½x 26x 26	5x 32x 32	6x 36x 36	7x 38x 40	8x 48x 44	9x 52x 54	Stat. 12x60x60 Mov. 10x60x60	18x 80x 80
4	6	8	8	8	12	20	20	20
19	24	24	28	36	38	38	44	54
4	6	6	8	9	12	18	18	22
8	10	10	12	15	18	24	24	36
3	4⅛	4⅛	4⅝	4⅝	5⅛	5⅝	6⅛	8¼
11	14½	12 to 16 Adj.	12 to 17½ Adj.	14 to 19½ Adj.	16 to 22 Adj.	18 to 24 Adj.	22 to 28 Adj.	30 Min. 44 Max.

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COVER

Duplex Chromium applies a much thicker layer of chromium than ever before possible, and increases corrosion resistance up to 500 per cent. Accelerated laboratory tests demonstrate that this thicker chromium can add years to the life of chrome plated trim on automobiles, even in areas where conditions are rated highly corrosive. In the photo, a technician measures the thickness of chrome plate on a bumper guard.

The DIE CASTING ENGINEER is published quarterly by The Society of Die Casting Engineers, Inc.—a society for the improvement and dissemination of the knowledge of the arts and sciences of die casting, the finishing of metals, and the allied arts. The DIE CASTING ENGINEER offers a concentrated coverage of management and engineering in the die casting and directly related industries.

Only advertising pertaining to die casting and finishing of metals and the allied arts is acceptable. The Society reserves the right to reject any advertising deemed objectionable for any reason whatsoever.

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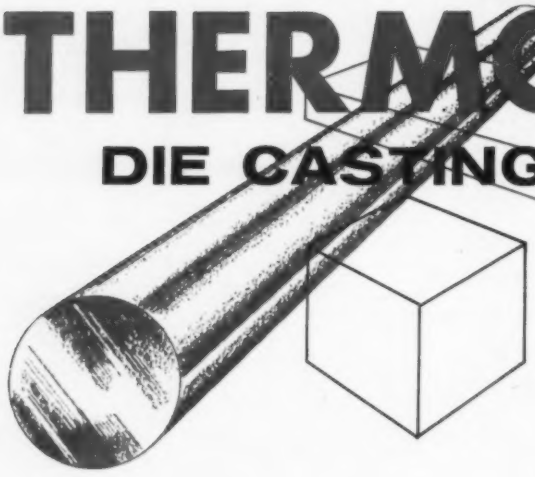

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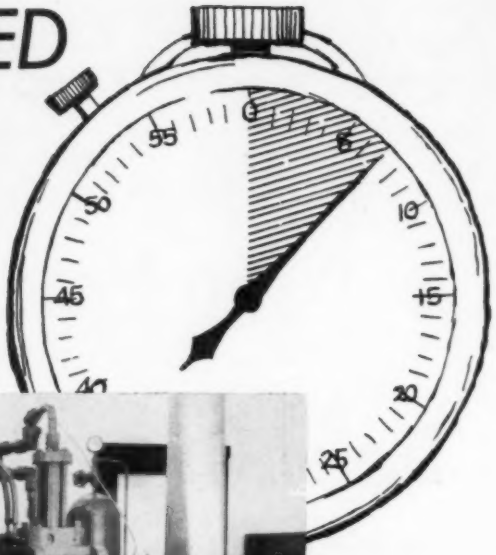

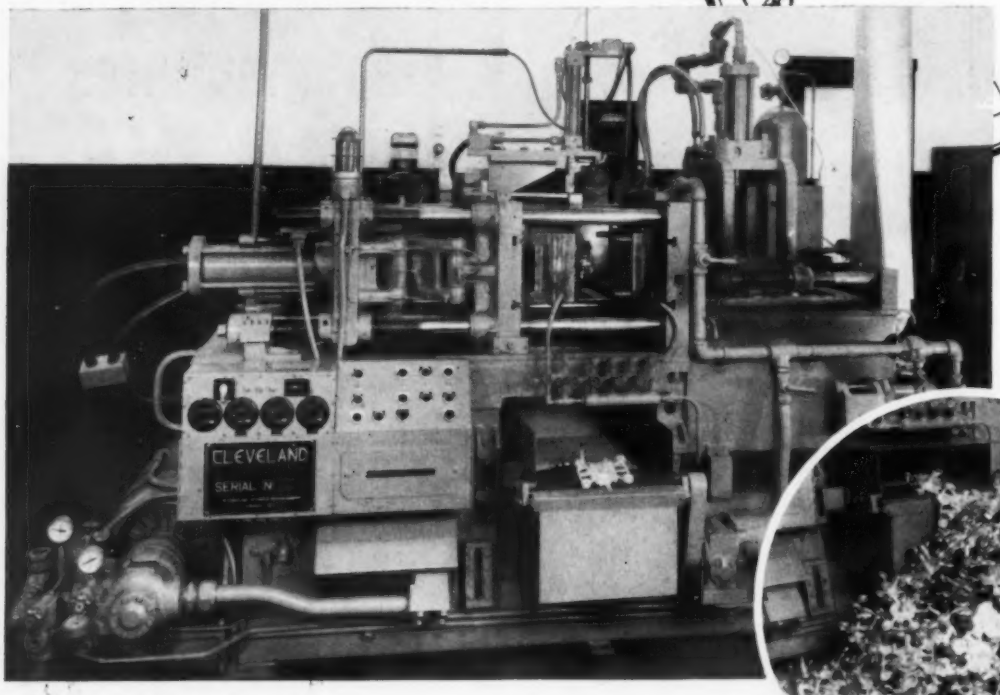

Here's die casting machine automation to the *nth* degree! The Cleveland shown above is in operation in our Die Casting Development Center, producing a gate of four zinc parts at a rate exceeding 500 shots per hour. This fast cycle operation includes casting ejection and conveying, plus automatic die lubrication.

Complete, fail-safe controls are incorporated. As an example, initial die closing uses low hydraulic pressure. If flash or other foreign matter of 0.012" or more thickness exists between the die halves, the die opens, stopping the cycle, and a signal light on the control panel indicates the source of stoppage. To speed set-up, all machine operating sequences are programmed by templates.

To die casters interested in cutting costs through automation, we extend a cordial invitation to schedule a visit to Cincinnati to see this machine in action. And this same invitation stands for those who desire to examine the industry's lowest cost, most efficient automatic aluminum ladling and vacuum die evacuation system in operation...for Cleveland has that, too!

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Thicker, more resistant chromium plate . . .

DUPLEX CHROMIUM

by EDGAR J. SEYB, JR.

Research Supervisor

Electrochemical Research Laboratory

Metal & Thermit Corporation

Detroit, Michigan

FOR MANY YEARS, THE PLATING INDUSTRY has been searching for an economical process for producing bright chromium deposits with increased resistance to outdoor exposure. Research throughout the industry has been directed toward solution of this problem.

Results of recent corrosion tests indicate that thicker chromium, properly applied, is one of the least expensive methods of achieving greater durability. In addition to work by Metal & Thermit Corporation, independent studies at Battelle Memorial Institute sponsored by American Zinc Institute have concluded, as recently as last October, that "increasing the thickness of copper and nickel is less effective in preventing corrosion than increasing the thickness of chromium."

The automobile industry, the largest user of electroplated parts, has become more and more quality conscious, in response to public demand. As a result, higher performance standards have been set for exterior plated parts. This is borne out by the new severe accelerated corrosion tests developed by the industry in cooperation with A.E.S. and A.S.T.M.

Two new tests have been adopted by the automotive industry to evaluate performance of chromium plated exterior parts. Advantages claimed for these tests are: 1) more indicative of actual service performance, 2) faster, and 3) more reproducible.

CORRODKOTE TEST

The Corrodkote Test follows procedures developed by Chrysler Corporation's engineering department, in cooperation with A.E.S. Research Project #15. This test now is used by both Ford and Chrysler. It consists of application of a standard, highly corrosive slurry in a uniform coating on the part or panel to be tested. After this coating dries, the test piece is placed in a non-condensing humidity cabinet for 16 hours, after which the piece is cleaned and corrosion evaluated. When additional cycles are to be run, the slurry is re-applied at the beginning of each.

COPPER-ACCELERATED ACETIC ACID SALT SPRAY

This test, commonly called the CASS Test, follows procedures prepared by General Motors Corporation. An extension of the more familiar Acetic Acid Salt Spray Test, the CASS Test adds copper chloride to the test salt solution, and also increases test temperature. The rate of attack is thereby speeded up from four to six times.

The following A.S.T.M. designations are commonly used to evaluate corrosion. A rating of 8 generally is considered minimum passable for production quality control purposes.

A.S.T.M. Rating	Per Cent Corrosion
10	0
9	less then 0.1%
8	0.1 – 0.25%
7	0.25 – 0.5%
6	0.5 – 1.0%
5	1.0 – 2.5%
4	2.5 – 5.0%
3	5.0 – 10%
2	10 – 25%
1	25 – 50%
0	more than 50%

Sixteen hours of either Corrodkote or CASS Test is generally accepted to be equivalent to one year's service in the Detroit area—considered to be as severe corrosion-wise as any location in the country because of snow and salted streets, and because of its heavy industrialization.

With the standard 0.01-mil (0.00001-in.) deposit of chromium that commonly has been specified in the automobile industry for the last 25 years, failures are common in 16-hour Corrodkote or CASS Tests. Until recently, it has not been possible to increase the thickness of the chromium without causing high surface stresses; these produce deep cracking and a consequent rapid reduction in corrosion resistance.

Steps toward thicker chromium

In 1953, Metal & Thermit introduced Unichrome Crack-Free Chromium CF-500 bath as a means of producing a thicker and more corrosion-resistant deposit without cracking. The deposit produced with this bath had a satin finish suitable for industrial purposes. But for decorative use it required buffing.

In view of the outstanding results obtained with this bath in the production of wear and corrosion-resistant deposits, there was interest in a bath which would produce crack-free deposits that were bright. Further research resulted in development of the Unichrome Bright Crack-Free CF-520 bath. In addition to producing thicker bright deposits with no cracks, it was found to possess unusual covering and throwing power; the ability to provide thicker chromium in recesses.

Research has been conducted on both cracked and crack-free chromium. And, a special operating procedure using

SRHS formulation CR-110 has been developed which produces a unique crack pattern. Plated over a crack-free CF-520 chromium deposit, the combination drastically alters the corrosion picture from anything previously known in the plating industry. This improved corrosion resistance results from the unusual structure of the chromium as deposited. The SRHS formulations are the most practical systems available for plating bright chromium on chromium commercially.

Duplex Chromium

In developing a successful duplex chromium process, many combinations of different types of deposits were plated and evaluated. This M & T research led to the combination of crack-free CF-520 and SRHS Special CR-110 chromium, capitalizing on the advantages of each. The result is the present Duplex Chromium process, consisting of an initial application of bright crack-free CF-520 chromium for optimum coverage and build-up in low current density areas, followed by a second bright deposit of finely cracked chromium from a specially operated CR-110 bath.

SRHS Special CR-110 chromium has also been applied over ordinary chromium, but only with limited success. This combination is not as effective because ordinary chromium deposits do not have the ability of CF-520 to provide better coverage and freedom from cracks in deposits thicker than .01 mil.

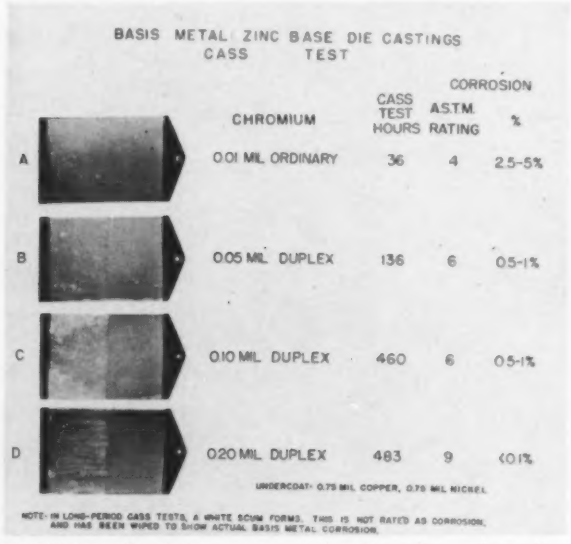
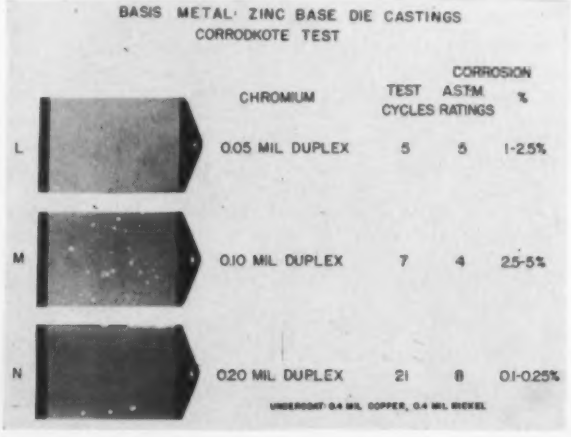


FIGURE 1 (above)—Cass tests on zinc base die castings show Duplex Chromium improves corrosion resistance.

FIGURE 2 (below)—Corrodkote tests on zinc base die castings confirm the improved corrosion resistance of Duplex Chromium.



In the CF-520 plus Special CR-110 duplex process, each of the two types of chromium has different physical characteristics. No buffing is required of either deposit.

The corrosion of plated automotive trim parts, which has caused so much concern, is due to the rapid pinhole rusting and blistering attributed to electrolytic cell action. This is explained as the reverse of depositing metals; that is, the corrosion is a stripping action where the rate of penetration and removal of metal is dependent upon the cell potential. The higher the voltage (cell potential), the more rapid the rate of stripping and therefore of corrosion. Since electroplated metals normally do not bridge defects, a few isolated spots corrode rapidly because all the cell potential is concentrated at these defective spots.

When a finely cracked chromium is deposited on top of the crack-free chromium, there results a very low rate of corrosion, or none at all. This is because the many cracks over the entire surface disperse the cell action over a large area. Therefore, there is a substantial reduction of the current density at each of these many individual openings. This keeps the current density below the value corresponding to the critical potential required for the anodic perforation of the underlying metals.

While a single thick layer of crack-free chromium upgrades corrosion protection significantly, a second deposit of finely cracked chromium has been found to provide even greater benefits—extending the CASS test performance with .1 mil of chromium to approximately 200 hours. Corrodkote tests, normally stopped after one cycle, had to be run six complete 16-hour cycles to reach the same degree of failure.

It is more difficult to protect zinc-base die castings than steel, due to the fact that they contain more voids and imperfections. Plating baths, as explained previously, cannot bridge all the surface imperfections. However, this new Duplex Chromium process is producing improvements of 100 per cent or more in corrosion resistance on regular production run die castings. For example, one large die cast plater, who formerly plated with .01 mil of chromium on normal undercoats, had only 10 per cent of his parts pass a 16-hour CASS test. Now, with Duplex Chromium, over 80 per cent of the parts pass a much more rigid 32-hour CASS test.

Major producers of electroplated parts for the automobile industry are now using Duplex Chromium in production. Many others are known to be studying the process actively.

Metal & Thermit's research personnel in Detroit, and plating engineers in the automotive industry, have conducted many tests on Duplex Chromium. The results, in general, can be illustrated by the following examples:

Comparison Tests

Test 1

Basis Metal: Zinc Base Die Castings

Method of Test: CASS Test

Note: In long period CASS test a white scum forms on the surface but this is not considered detrimental or rated as corrosion. The bottom half of each panel shown in Figure 1 was wiped to remove this scum and shows the degree of basis metal corrosion.

Undercoat: 0.75 mil Copper plus 0.75 mil Nickel

Chromium	Cass Test Hours	Corrosion A.S.T.M. Rating	Corrosion Percentage
A. 0.01 mils Ordinary	36	4	2.5–5%
B. 0.05 " 50/50 Duplex*	136	6	0.5–1%
C. 0.10 " "	460	6	0.5–1%
D. 0.20 " "	483	9	less than 0.1%

* Note: 50/50 Duplex means equal thicknesses of CF-520 and Special CR-110 to produce total shown.

Results of this test illustrate the great improvement possible in corrosion resistance by increasing chromium thickness through the use of a duplex coating. It should be remembered that the thick chromium deposit on specimen "D" is only 13 per cent of the thickness of the composite undercoat. See Figure 1.

Test 2

Basis Metal: Zinc Base Die Castings
Method of Test: Corrodkote Test
Undercoat: 0.75 mil Copper plus 0.75 mil Nickel

	Chromium	Corrodkote Cycles	Corrosion A.S.T.M. Rating	Corrosion Percentage
E.	0.01 mil Ordinary	2	4	2.5 – 5%
F.	0.05 " 50/50 Duplex	6	6	0.5 – 1%
G.	0.10 " "	10	7	0.25– 0.5%
H.	0.20 " "	21	8	0.1 –0.25%

The results here show the same general improvement resulting from thick Duplex Chromium deposits as illustrated in (1). They further demonstrate that the results obtained are independent of the test procedure used to produce accelerated corrosion.

Test 3

Basis Metal: Zinc Base Die Castings
Method of Test: CASS Test
Undercoat: 0.4 mil Copper plus 0.4 mil Nickel or total undercoat 0.7 mil less than (1) and (2)

	Chromium	Cass Test Hours	Corrosion A.S.T.M. Rating	Corrosion Percentage
I.	0.05 mil 50/50 Duplex	68	2	10 – 25%
J.	0.10 " "	136	6	0.5 – 1%
K.	0.20 " "	483	7	0.25–0.5%

In this set of specimens, the thickness of undercoat has been reduced almost 50 per cent. The effect where thinner coatings of Duplex Chromium have been used is quite marked, but where the chromium thickness is 0.2 mil, the effect of the thinner undercoat is hardly apparent.

Test 4

Basis Metal: Zinc Base Die Castings
Method of Test: Corrodkote Test
Undercoat: 0.4 mil Copper plus 0.4 mil Nickel

	Chromium	Corrodkote Cycles	Corrosion A.S.T.M. Rating	Corrosion Percentage
L.	0.05 mils 50/50 Duplex	5	5	1 – 2.5%
M.	0.10 " " "	7	4	2.5– 5%
N.	0.20 " " "	21	8	0.1–0.25%

This duplicates (3) except for the method of testing, and again shows the results to be substantially independent of the method of test. See Figure 2.

The following tests were made on actual automobile production parts, using both Corrodkote and CASS tests.

Test 5

Basis Metal: Steel Parts (Automobile Grille Section)
Method of Test: CASS Test
See Figure 3.

	Copper	Nickel	Total Undercoat	Chromium	CASS Test Hours	Corrosion A.S.T.M. Rating	Corrosion Percentage
A.	0.4	0.8	1.2	0.01 ordinary	.48	2	10-25%
B.	0.4	0.8	1.2	0.20 50/50 Duplex	325	9	less than 0.1%

Test 6

Basis Metal: Die Cast Zinc (Automobile Door Handle)
Nominal Undercoat: 0.4 mil Copper plus 0.7 mil Nickel
See Figure 4.

Part No.	Chromium	Test Method	Test Period	A.S.T.M. Rating	Percentage Corrosion
A	Ordinary	Corrodkote	1 Cycle	7	0.25–0.5%
B	Ordinary	CASS	16 Hours	7	0.25–0.5%
C	Duplex	Corrodkote	2 Cycles	9	less than 0.1%
D	Duplex	CASS	32 Hours	9	less than 0.1%

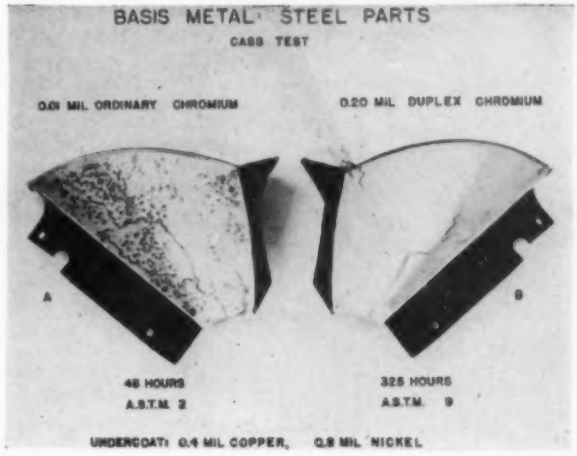
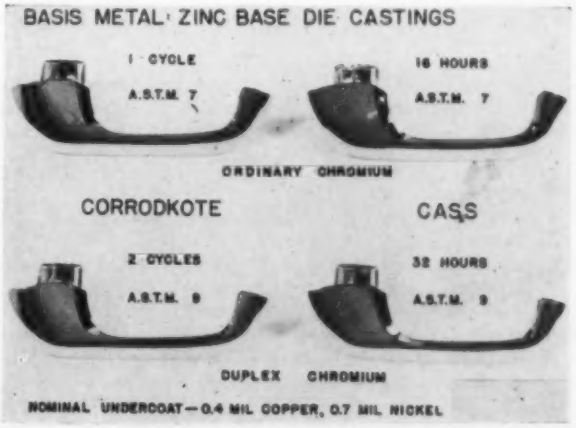


FIGURE 3 (above)—CASS tests on steel parts compare the corrosion resistance of ordinary chromium and Duplex Chromium.

FIGURE 4 (below)—Comparative testing with both the CASS and Corrodkote methods demonstrates that test results are independent of testing method.



Summary of test results

The results of these tests may be summarized as follows:

1. While great improvements in corrosion resistance may be obtained by the use of single thick chromium deposits, the most dramatic improvement is obtained by the use of heavy Duplex Chromium deposits involving first CF-520 and then Special SRHS CR-110.
2. The use of the Duplex Chromium deposits has proven successful on steel and zinc basis metals.
3. The results obtained are independent of the testing procedure. In other words, quality improvement averages as great with CASS test as Corrodkote test and vice versa.
4. The use of increased thickness of chromium has an effect many times that of an equal increase in thickness of the undercoat. A comparison of panels shows that an increase of only 0.05 mil of Duplex Chromium has an effect on corrosion resistance equal to that of 0.7 mil of undercoat. Thickness for thickness, Duplex Chromium is 14 times more effective in the tests illustrated.

Case examples

The following are case examples of specific applications and benefits produced by Duplex Chromium (CF-520 and Special CR-110) for several major electroplaters serving the automotive industry. They demonstrate both the improved throwing power and plating speed of the Duplex Chromium process:

Ventilator window frames

A changeover from ordinary to CF-520 chromium has increased minimum thickness from 0.007 to over 0.03 mil. Failures were frequent in the area of minimum current density before the changeover. Formerly, the chromium thickness on this part varied from 0.007 to 0.07 mil, a ratio of 1:10. With CF-520 the thickness ranges from 0.03 to 0.12 mil, a ratio of 1:4. The production time remained the same (5¾ minutes) but additional power was required.

With the addition of CR-110 on top of the CF-520 the thickness in the minimum current density area was found to total .058 mil. No effort was made to periodically check the high current density areas although it was known that the maximum thickness ranged over 0.1 mil without burning.

Back-up light section

The back-up light section for a high-production low-price car formerly ran from 0.006 mil in the low current density area to 0.045 mil in the high. Now, with the adoption of CF-520, it runs from 0.024 to 0.063 mil—a change from 1:8 to 1:3.

In this particular job, where several different parts were run simultaneously, the area on the plating racks varied from four up to thirteen square feet. Constant current adjustments were required along with segregation of work to keep mis-plates down to 28 per cent. With CF-520 chromium the generator output is set at maximum and left there, the work is mixed, and rejections have been reduced by 90 per cent.

The machine that plates these parts has not yet had the CR-110 chromium plating tank installed. Test work has shown that when CR-110 is installed a minimum thickness of 0.048 mil will be obtained on these parts.

Die-cast door handles

As mentioned previously, zinc-base die castings pose more corrosion problems than formed steel parts by virtue of surface imperfections. One manufacturer reports a substantial improvement in CASS test results using CF-520 and Special CR-110, noting that this process raised corrosion resistance substantially over other dual combinations and single chromium deposits—even when these latter were equivalent to or more than the dual chromium thicknesses. The process now yields a minimum of 0.03 mil of chromium in difficult recesses without increasing plating time. Previously they were unable to plate even 0.01 mil in recesses.

Duplex Chromium in production

In the Duplex Chromium plating installations now running, the procedure is to plate a minimum of four minutes with M & T's CF-520 Chromium at an average current density of 1½ ASI, 8 volts, and 120° F. tank temperature. This is followed by a reclaim rinse and one water rinse. Next is another five minutes in SRHS Special CR-110 solution at approximately the same current and tank temperature, at 7½ to 8 volts.

This procedure puts on about 0.1 mil total chromium in the average current density areas, and with far greater thickness in the low current density areas than previously possible, and without burning in the high current density areas.

If the equipment available does not have enough length for a second chromium tank a separate tank can be used for the SRHS Special CR-110 solution. If the work dries between these operations, it is recommended that the parts be cleaned by soaking for 3 to 5 minutes at 180° F. without current in an alkaline electrocleaner. This is followed by two cold running water rinses, and the final chromium plating operation.

With ordinary baths, on parts such as automobile bumpers, 150 ASF is the usual maximum current density permissible without burning of the chromium. With CF-520, platers have run as high as 420 ASF with no observable burning. However, it is also possible to plate successfully as low as 120 ASF. This unusually wide bright plating range makes it practical to produce bright deposits in recessed areas without burning at high current density points.

An additional production advantage of the Duplex Chromium process is the ability to re-plate rejects, which cannot be done with ordinary baths. And, because of the excellent throwing power of CF-520 for the chromium undercoat, auxiliary anodes rarely are required.

The ordinary high ratio (175/1; CrO_3/SO_4) bath used to produce crack-free chromium in laboratories has not proven practical in production plants because of mis-plates and brown stains on the nickel and with little or no chromium in recesses.

Changeovers to Duplex Chromium

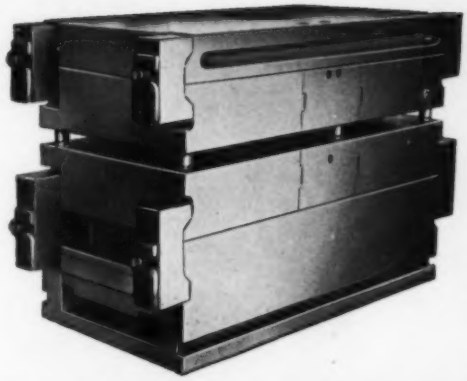
In one production installation, a number of automatic machines used for plating exterior zinc die castings have been converted to CF-520 as a means of achieving increased chromium thickness specifications. Second chromium tanks for CR-110 were installed. The plating time in each bath varies but in no case does it exceed 10 minutes total in both baths.

In some machines these changes are quite easy to do by simply removing the drier from the machine and utilizing this space for the additional CR-110 tank. The drier is then set up on the conveyor line that removes the parts from the machine in the inspection department.

Results indicate that per dollar invested in equipment and solutions, this new technique provides far greater benefits in terms of corrosion resistance than a corresponding expenditure for the production of undercoats.

MEET THE AUTHOR

Edgar J. Seyb, Jr., received his AB degree at Sterling College, Sterling, Kansas, in 1946, with majors in physics and chemistry. He obtained his Ph.D. degree in inorganic and physical chemistry at the University of Kansas in 1950. Since that time, Dr. Seyb has been associated continuously with electrodeposition research, and is presently Research Supervisor at the Metal & Thermit Corporation's Research Laboratory in Detroit. He is a member of A.E.S., The Electrochemical Society, and A.C.S.



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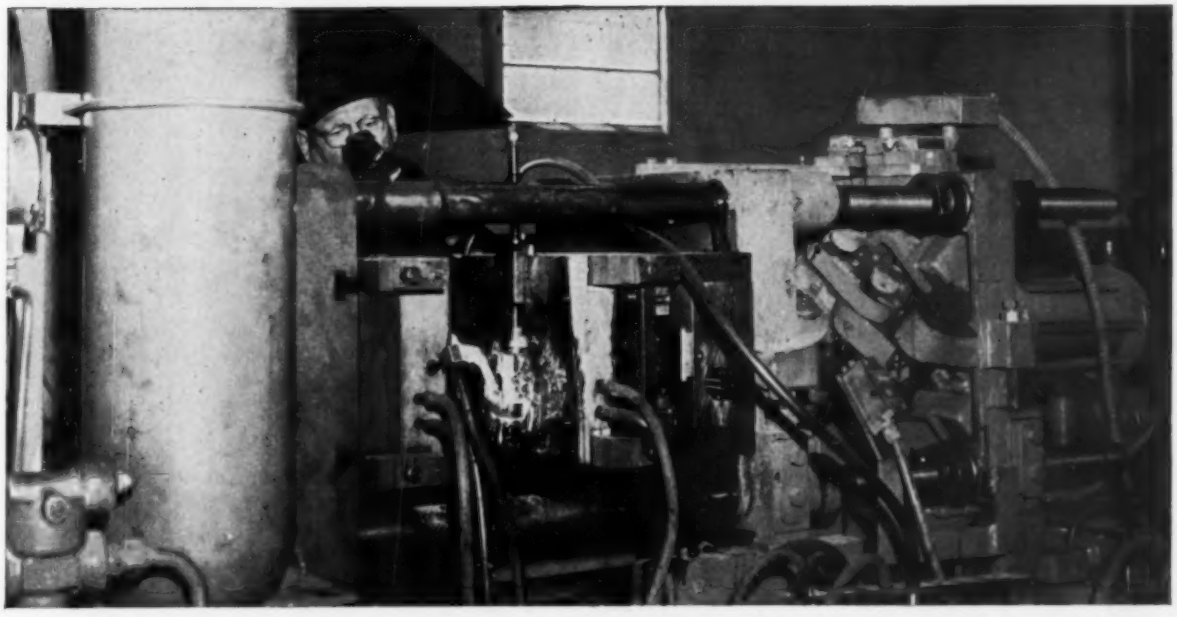

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by **WILLIAM C. KENNEDY**
Technical Coordinator

and **EDWARD A. DAY**
Sales Manager
American Charcoal Company
Detroit, Michigan

ASSUMING THAT THE RELEASE AGENT is properly formulated, that a suitable extender is being employed, and that the solution is properly applied, a release agent can indirectly produce additional problems. The direct source of the trouble will be the gas torches applied to the nozzle of hot chamber die casting machines. Improper application of the torches may result in overheating the molten die cast metal to a point where, as the metal enters the die cavity, the boil point of the thin film of release agent on the die cavity surfaces is approached and violent bubbling or evaporation occurs, producing porosity, pits and blisters. Gas torches under excessive gas pressure, installed too far into the recessed area of the front platen where it surrounds the nozzle, may result in spottily increased temperatures on the die cover half causing dimples around the sprue, a dripping sprue, blisters and pits in the surface of the casting or heat shrink. These adverse conditions arise from a disturbed solidification process within the casting. Nozzle heat should range between 900 and 1000°F. to eliminate the above problems and to prevent burnt-out or split nozzles (see Figure 1). At these temperatures, no rosy glow appears in the nozzle and a slight fracture will be noticed on the end of the sprue.

Much work has been done by industrial heating equipment manufacturers to produce both gas (radiant heat) and electrial units (enclosed elements) for nozzle heating and, with some limitations, they are proving more acceptable, economical and effective than the conventional gas torches (see Figure 2).

Platens and die cover halves, deeply recessed to accommodate long nozzles, frequently become overheated, causing carbon on die cavity surfaces and blisters and solder on the castings, thus interferring with heat loss by both conduction and convection. Primarily, this is due to the manner in which the gas torches are directed into the recessed platen area, and to excessive billowing flame. Some die casters have solved this problem by water cooling the platen. Others sometimes do this, but are more apt to drill 1- or 1½-inch holes into the die block from each side, all terminating in the recessed area around the nozzle. Three of these holes serve to provide an escape route for excessive heat. The fourth accommodates a torch and usually is the hole drilled down from the top of the die block. If preferred, a single torch can be inserted into the deep recess in the conventional manner. It should be remembered that the hottest, most penetrating part of any flame is its tip. Excessive billowing flame against or around any surface is pure waste of fuel.

Detergent type release agents

Some of the most effective release agents for all types of die casting available on the market today, from the stand-

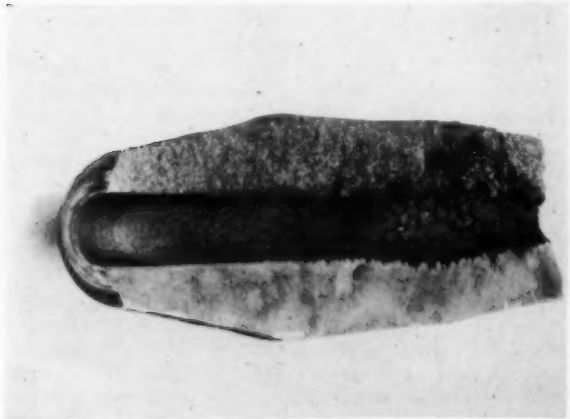

FIGURE 1—Heating above the normal range of 900–1000° F. caused this nozzle to burn out.
Photo courtesy Rex Buckeye Co., Cleveland, Ohio.

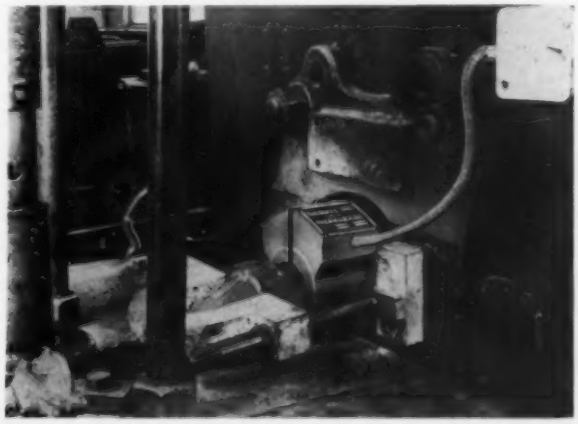

FIGURE 2—An enclosed element electrical nozzle heater has proved to be very effective and economical.
Photo courtesy Thermel, Inc.

point of providing adequate lubrication while preventing carbon formation on die cavity surfaces, are the detergent type release agents. These products perform very well when extended with a good quality solvent to thin the base product and activate the detergent phase. The detergent release agent is almost a must on diamond-polished dies where carbon build-up is especially objectionable.

Providing a detergent phase in release agent formulations prevents formation and adherence of tar-like residues which tend to form on hot surfaces with the use of most oils. A detergent type release agent can be applied in the conventional manner to a die cavity surface already coated with these tars or carbon residues, and within a half to three hours the cavity surfaces will be purged of such deposits.

Detergents do not dissolve carbon deposits on die cavity surfaces. Instead, they merely dissolve the binder that holds the particles together. The binder is usually a gum that forms in petroleum oils when used in sustained high temperatures. Continued use of detergent release agents provides a continuous washing action that prevents further build-up of residues on die cavity surfaces. Just as soap and water aids in washing oil from hands, the addition of a detergent to a release agent formulation results in washing residues from the surfaces of die cavities.

Pigmented release agents

Detergent products are available in both the pigmented and unpigmented varieties. The unpigmented release agents come better recommended because when the balance in a pigmented product is too greatly disturbed through liberal additions of extender, much of the pigment gravitates out of solution and settles to the bottom of the release agent container. However, inserting an air hose into the container or using a container equipped with an agitator solves the problem.

Some pigments serve a useful purpose in aluminum die casting release agents. They tend to absorb some of the shock produced by impingements of the molten metal against die metal and provide a sliding medium to overcome drag during ejection in areas having meager draft angles. In such cases, solder, drag and hung-up castings can sometimes be eliminated. However, ingredients other than pigment contained in the release agent must also possess sufficient high temperature and tenacious high pressure lubrication to perform their proper function when, due to pressure, the particles of pigment might be caught-up in the stream of metal and carried away from the surface on which they were deposited. This can easily happen because the pigment is suspended in oils and does not, in itself, have any affinity for die metal.

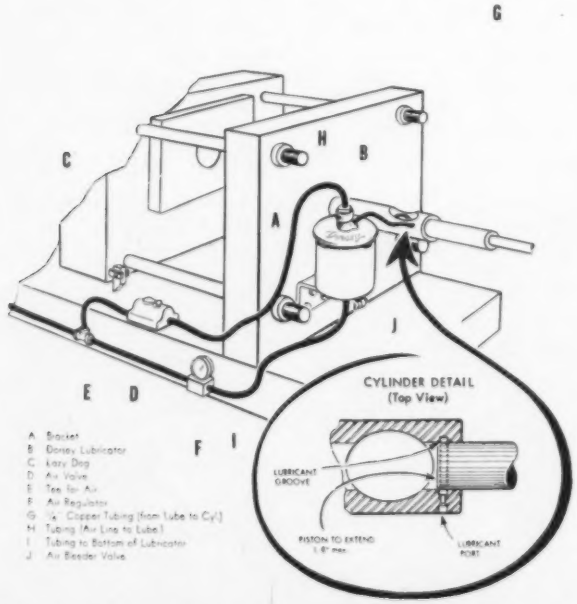

FIGURE 3—An automatic plunger lubricator will increase production and plunger sleeve life while reducing maintenance and lubricant costs.

Photo courtesy Westbrook Mfg. Co., St. Joseph, Mich.

In aluminum die casting a fine mesh pure aluminum powder will not detrimentally affect the finish of the casting. Graphite, on the other hand, can dull or dirty the finish.

Pigments are seldom used in zinc castings. But when all else fails to provide sufficient relief, adding a quarter ounce of aluminum powder to a gallon of zinc die casting release agent may provide the answer without causing plating or painting difficulties.

Detriments in release agents

Animal fats can become acidic on hot die cavity surfaces. They are a source of interfacial corrosion and surface corrosion on castings. Animal fats are frequently found in both zinc and aluminum release agents.

Beeswax, while performing excellently in the release of castings from a faulty die or in removing a casting that has hung-up in the die, if not completely removed prior to plating, will cause pits or blisters and poor adhesion to the plate. Removing beeswax from a cast surface can be accomplished with boiling turpentine. It is a costly and tedious procedure.

Some silicone emulsions are problem producers in that they can build-up on die cavity surfaces in the form of a white-to-gray film that may leave impressions in the surface of the castings. Special care must be exercised during painting and plating operations with the use of certain silicone emulsions.

Unless some provision has been made in the formulation of a water extendable release agent to counteract the effects of hard water salts, it is advisable to use distilled water rather than tap water. Hard water salts can cause a rough deposit on die cavity surfaces and, exactly like carbon formation occurring from faulty release agents, this residue will provide porous anchorage for die cast metal particles that may fuse with the molten metal and result in solder or drag marks on the casting. Providing counter-measures for the effects of sulphates, chlorides, iodides, and similar hard water salts is essential to preclude pitting and corrosion of die cavity surfaces.

Other problems with release agents

A myriad of microscopic pits and blisters on plated surfaces are frequently blamed on the plater, but as a general rule, they can be traced to the use of a release agent containing an excess of lubricity. This condition usually can be eliminated by further extending the release agent with an appropriate diluent.

Some automotive trim and appliance hardware casting dies are constructed in such a manner that the travel of the metal is so far from the sprue and/or gate, that cold shot appears in the casting, particularly at the extremities of the metal flow. Installing gas-air torches or infrared heating units usually solves the cold shot problem, but may introduce an oil shot pattern. This latter problem could result from insufficiently high local temperature in the die cavity resulting in incomplete evaporation of the diluent, or from an excess of release agent applied to the balance of the cavity that was picked-up by the metal flow and became entrapped at this extremity. Usually the thinnest possible film of release agent applied to such die areas, with the spray gun held as far away from the die cavity face as possible, will dispense with such problems.

While spraying the cover half of the die is seldom advisable where finish is a factor, it can be done without disturbing finish only when lubricity in the release agent is reduced to an absolute minimum through liberal addition of an appropriate diluent. This will probably call for spraying both halves of the die between every shot to avoid hang-ups, particularly in the ejector half. If the cover half must be sprayed to obtain release or metal flow, this is one way it can be done.

Lubricating toggles, wedges and core mechanisms

With the advent of automatic lubrication for toggles, wedges and all other moving parts of the basic machine, lubrication becomes a simple matter and wear is reduced to a minimum. Manufacturers' recommendations should be followed whenever possible in regard to the type of lubricant used. Many machines are in use today without this feature, and where installation of automatic lubricating devices is not practicable, introducing a molybdenum di-sulphide grease or viscous oil through zerc fittings has proven satisfactory.

Coating all working surfaces prior to assembly with either molybdenum di-sulphide grease or viscous oil will prove helpful. Sleeves housing moving cores and mechanisms, or linkages activating movable cores respond exceptionally well to molybdenum di-sulphide greases and oils.

Lubricating ejector pins

When a release agent is applied by a pressurized or syphon spray gun, some lubrication for the ejector pins is drawn into the pin holes with the inward movement of the pins or closing of the die. The effectiveness of this method of lubricating pins will depend largely upon whether or not the pin hole is relieved a half inch or so back from the die face. If it is, this method, plus periodically spraying the other end of the pins ahead of the ejector plate should suffice.

With the advent of automatic lubrication and long-run dies, some die casters are gasket mounting a plate on the back face of the die block. Channels are cut from the top of this plate down to each ejector pin. The lubricant is fed into these channels individually and, for the most part, automatically. Some are mounting a small enclosed chamber on top of the die block and depending upon gravity feed to introduce sufficient lubrication to ensure the need is satisfied. Sometimes the mounting of this extra channeled plate will require extra length in the ejector pins, but in any event, those who have chosen this method of lubricating ejector pins claim they have positively eliminated pin troubles.

Lubricating plunger tips and shot sleeves

Plunger tip lubricants can be the source of much down time and replacement or repair of plunger tips and shot sleeves. Some die casters still use such ingredients as white lead, sulphurized or chlorinated oils and coarsely ground graphite, mica and other laminae. The highly toxic effects of white lead caused it to be banned in most states. Chlorine and sulphur are toxic in effect also. Coarsely ground laminae do not penetrate the closely toleranced confined areas between the shot sleeve and plunger tip. The use of these coarse laminae produces galling, excessive wear and erosion.

Plunger lubricants must retain their viscosity (Seybolt 250 at 650° F. minimum) and tenacity when applied to a hot tip or they will either drip to the floor or blow back over the plunger rod, contributing toward poor housekeeping.

When plungers are improperly aligned with the shot sleeve, plunger tips tend to wear excessively on one side. When this occurs, the die cavity will become blasted with plunger lubricant which in turn becomes entrapped in the molten metal resulting in oil pools or porosity within the casting. This will occur with or without vacuum.

Eliminating sticky plungers and solder build-up in shot sleeves by providing a superior plunger lubricant can sometimes introduce fill problems in the casting cycle. When a die has been modified to produce acceptable castings in equipment where chronic plunger and cold chamber problems once existed, overcoming these problems may change the rate of fill in the cavity and the degree of compaction in the casting. A slow, hesitant fill may not require the same number or size of vents as for the more rapid, unhesitant fill in the modified machine. A change in venting would be indicated if large voids or lack of fill become evident in the casting.

Automatic plunger lubricators (see Figure 3) in conjunction with the proper plunger lubricant can provide a more compact, crystalline structure in the casting, increase shot sleeve life, increase plunger tip life by 100 to 500%, reduce plunger tip lubrication consumption by approximately 50%, increase production by approximately 33% and reduce equipment maintenance, while reducing operator fatigue and improving housekeeping in the bargain.

Automatic plunger lubricants perform most effectively with unpigmented plunger lubricants. Pigments tend to gravitate out of solution no matter how viscous the product. The extent of gravitation is usually around 3% of pigment content per month. When gravitation occurs in lines or valves in any way related to the automatic plunger lubricator, the pigment compacts and chokes off volume delivery of the lubricant. When grooves are cut into shot sleeves to accommodate automatic plunger lubrication, these grooves become impacted with pigment, reducing effectiveness of the lubricator and contributing toward reduced shot sleeve and plunger tip life.

While the chemistry of lubrication, particularly as it relates to hot work application, is broad and complex, we have attempted in the foregoing to illustrate some basic principles of lubricant selection and application. Proper application of these modern lubrication techniques will result in improved production, longer die life and lower unit cost.

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Chapter News

John MacLauren appointed Chairman of International Die Casting Exposition and Congress

The SDCE is proud to announce that it will sponsor an International Die Casting Exposition and Congress on November 16 through 19, 1960. John MacLauren, Sales Development Engineer, Aluminum Limited Sales, Inc., Detroit, Michigan, has been appointed Chairman of the International Die Casting Exposition and Congress. John succeeds George F. Griffenham, who was responsible for the concept of an exposition.

The site of the show will be the Detroit Artillery Armory, 15000 West Eight Mile Road, Oak Park, Michigan. The show will feature exhibits by die casters and those closely connected with the industry, as well as a conference consisting of a series of papers delivered by specialists in fields related to die casting.

It is hoped that the members and friends of the SDCE will give the show their enthusiastic endorsement and render whatever assistance is required to make the show a resounding success. Further announcements concerning the show will be made in the DIE CASTING ENGINEER, and an organization is being set up to make contacts in the field. In the meantime, applications for space will be received at the SDCE executive offices.

Members of the Society who have technical papers relating to die casting and its allied fields, which might be suitable for presentation at the Congress, are invited to contact the Society office at their earliest opportunity.

Earl R. Mason new Director of Research and Development of SDCE

The Board of Directors of the Society of Die Casting Engineers, recognizing the importance of sponsoring research and development in technical projects of value to the die casting industry, has appointed Earl R. Mason as Director of Research and Development. Mr. Mason is the project manager of a firm specializing as consultants to the die casting industry.

The research and development program of the Society needs the wholehearted cooperation of its members. The Society is asking for volunteers to serve on the committee that will work on selected projects.

Some of the first projects to be undertaken will consider the relative castability of primary and secondary metals, conduct a survey of U.S. Government research and development that can be applied to the die casting industry, study the double nickel process in plating die castings, and look into improved steels for dies and molds.

If you have information or ideas that will contribute to this program of research and development, please address them to Earl R. Mason, 608 West Manlius Street, East Syracuse, New York.

Chapter News

Harry Cagin organizes trip to International Die Casting Conference in Stresa, Italy

There has been an enthusiastic and overwhelming response to the announcement of a European trip sponsored by the SDCE for its members. Most of the replies requested a four week trip, with the option of a guided tour or a week on your own for the fourth week.

Plant visits will cover some of the largest and most interesting die casting plants in Europe. At Stresa, Italy, the Third International Pressure Die Casting Conference will " . . . provide pressure die casters from every country with an opportunity to come together and exchange ideas, to discuss problems, and to publicize the advantages and possibilities that the die casting process offers to industry". At the conference papers will be presented on the production of dies, on the study of gating, on metal flow, on plating, on the hardness of metals for die casting and on general developments in the die casting world. There will be simultaneous translation of papers in English, French, German and Italian.

The tour will be a chartered flight and the number of people that can be accommodated will be limited. As soon as the plane is filled no additional people will be registered unless there are cancellations. A deposit of $200.00 will be required to register for the trip, with the balance being due before February 15, 1960. No cancellations will be accepted or refunds made unless the plane is oversubscribed.

The trip can be made in either of two ways:

1. Complete four weeks, $1000.00.
2. Tour with May 21 through 27 on your own, $840.00.

Transportation intercity:

Plane—chartered with scheduled airliner.
Rail—first class.
Steamer—first class.
Bus—deluxe motorcoach.

Hotels:

First class with bath, two to a room.

Meals:

Two meals per day, continental breakfast plus choice of lunch or dinner will be provided at hotels.

Duncan Hannah new Chairman of National Standards Committee of SDCE

Duncan Hannah, President of Die Cast Die Designs, Detroit, Michigan, has succeeded John Lapin of Central Foundry Division, GMC, as Chairman of the National Standards Committee.

M. R. Tenenbaum, Secretary, and John Lapin, Lee G. Axford, Harris R. Shimel, Folke Halward, Harry E. Eriksen, F. Czumbil and Clarence Tice, Committeemen, with the cooperation of the representatives of manufacturers of die casting equipment have in the past year published the T-Slot Pattern and Clamping Capacity Standards. Other important standards are under consideration for the coming year.

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NEWS of the INDUSTRY

Dow develops new high-temp die-castable alloy

Development of the first die-castable metal alloy for service above 500 degrees F was claimed recently by The Dow Chemical Company. Dow identified the alloy as a new member of the magnesium-thorium group and said it contains approximately one per cent thorium, one per cent manganese, balance magnesium. It is designated HM11XA.

The new alloy retains good mechanical properties through 800 degrees F. Several HM11XA parts produced in Dow's die-casting facilities are currently being evaluated in aircraft and missile applications. Besides being the first die-casting alloy in any metal for service at these elevated temperatures, HM11XA also features minimum weight, having a density of only 0.064 pounds per cubic inch.

Dow also reported:

—Separately die-cast test bars of the new alloy exhibited average tensile strength of 30,200 pounds per square inch at 70 degrees F, 16,800 psi at 400 degrees F, 12,400 psi at 600 degrees F and 7,800 psi at 800 degrees F.

HM11XA is the fourth member of the magnesium-thorium family to be introduced by Dow. The company also produces HK31A in sheet and sand cast form and as forging stock; HM21A in sheet form and as forging stock, and HM31A in extruded form.

—The alloy can be die cast in regular equipment with a minimum of changes from standard procedure.

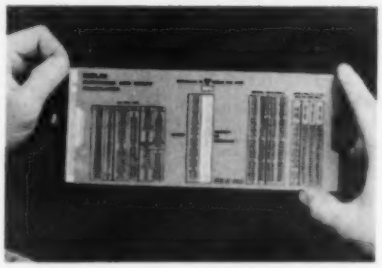
—Radiographic studies indicate that parts can be die cast in HM11XA with internal soundness equivalent to that of parts die cast in AZ91B, the standard magnesium die-casting alloy.

—Room temperature tensile yield strength of HM11XA is almost equivalent to that of AZ91B.

—The new alloy can be finished with nearly all of the finishes currently used on magnesium.

CIRCLE 12 READERS SERVICE CARD

Calculate Shrinkage and draft with Kelm slipstick



A new and compact shrinkage and draft calculator is announced by the Kelm Manufacturing Co., Coloma, Michigan. The calculator is of the familiar plastic slide-chart type, and provides a time saving and error reducing method of determining shrinkage and draft values.

The calculator also includes charts of tap drill sizes, decimal tables and other frequently used data. Conveniently pocket sized and made of green easy-to-read plastic, the calculator is a valuable tool for all those engaged in casting or molding industries.

CIRCLE 13 READERS SERVICE CARD

DIE CASTING

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Wanted Immediately. Experienced zinc. Top wages, fringe benefits.

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CIRCLE 14 READERS SERVICE CARD

DIE CASTING MACHINES FOR SALE

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1—Cleveland #400, 400 tons 1952. Has everything possible. rebuilt and guaranteed. $10,000.

2—Lester 600 tons Aluminum and one Zinc. Guaranteed.. Each $12,500.

1—Kux Aluminum 500 tons HP35. Little used, complete: $13,500.

2—Kux BH-18 Zinc 300 tons. Rebuilt last year. Ea. $6,500.

1—Eckstrom-Carlson, Rockford, Ill. 800 tons Aluminum, rebuilt. A real fine modern machine with everything, $21,500.

We have 40 additional machines in stock of all sizes and makes. Please inquire.

Lindberg and Ajax Electric furnaces 20, 30, 40 and 60 KW.

Also gas-fired furnaces in all sizes and shapes.

Induction & Gas Furnaces from 400-2,000 lbs. cap.

1—Nitrogen pressure flask, drawn from one piece of Steel. 2,000 psi. 24" dia. x 13 ft. long with valve. Tested by Lloyd.

DIECASTERS EQUIPMENT DIVISION

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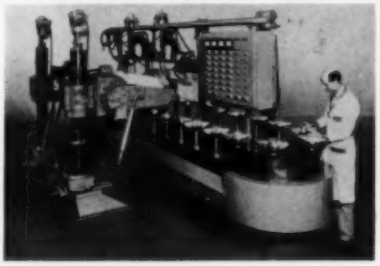
CIRCLE 15 READERS SERVICE CARD

INDUSTRY

Acme automates polishing and buffing



A new Acme line-type universal straight-line automatic polishing machine that provides maximum compactness and operation flexibility for high production parts is now available from Acme Manufacturing Company, 1400 East Nine Mile Rd., Detroit 20, Michigan.

Basically the machine consists of an in-line conveyor that moves one-foot long cast iron platens around the periphery of the unit. A special motorized chain drives the platens at feed rates from 4 to 29-ft. per minute. The platens are supported at top, bottom and sides by rollers. Work spindle assemblies are attached to each platen with dovetail mountings. Sprockets on the end of each spindle assembly can be driven in either direction by separate fixed or motorized roller chain arrangements at any position along the conveyor to provide efficient polishing speeds. The spindles can also be provided with camming surfaces to provide preset work motions at any work positions.

The conveyor is made up of standard 4½-ft. sections. Platens are spaced one ft. apart. Work is loaded and unloaded from the work spindles at the end of the machine. The platens can be driven continuously or indexed from station-to-station as desired. The pushbutton control panel and compound applicator assemblies are mounted on the conveyor unit.

CIRCLE 16 READERS SERVICE CARD

Roto-Finish ups production rate 1000 %

The Vibratron, a newly developed machine for mass production cleaning, descaling, deburring, radiusing, fine finishing, and coloring of metal parts has been introduced at the Annual American Electroplaters' Society Show by the Roto-Finish Co., Kalamazoo, Michigan.

Complex cast, forged, stamped, and machined parts with shielded and internal surfaces are conviently finished in the new machine. Time cycles are very short with a rate of production up to 1000% greater than parts processed utilizing conventional barrel finishing techniques. The process is very economical inasmuch as only a few ounces of compound are necessary to do an effective job.

Unlike conventional barrel finishing where the abrasive action takes place in a sliding zone only several inches deep, the work zone in the Vibratron extends throughout the entire abrasive mass. Vibration is induced by a system of eccentric weights integrally mounted within the vibrating motor. The motor is mounted directly onto the bottom of the vibrating tank. The motor is completely water-proof, and power requirements are low.

CIRCLE 17 READERS SERVICE CARD

Duplicast builds on Shaw process

The Duplicast Corporation of Detroit, Michigan announces the opening of its complete foundry facilities for the operation of the Shaw Process of precision casting. Duplicast will utilize the Shaw Process to produce all forms of precision cast tooling and prototypes. In addition, a wide range of ferrous and non-ferrous alloys are available in cast forms suitable to the Shaw Process.

Carl F. Sielaff, Jr. is president of Duplicast with ten years experience in the fields of tooling and tool steels. Thomas P. Doyle is general manager with extensive experience in precision foundry work, having operated both the Shaw Process and the lost wax method.

CIRCLE 18 READERS SERVICE CARD

...Rejects knocking your profits for a loop ?

The alloys you're using may be at fault —

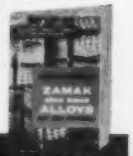
- **Do they *actually* meet specifications?**
- **Do your casters have to "make allowances"?**
- **Is the Inspection Department working "overtime"?**

Then it's time to be *sure!*

For good casting results your alloys must fulfill a considerable number of specific requirements. For instance, good fluidity to reproduce fine detail, fill out thin sections; stable properties to yield good surface texture, provide adequate mechanical strength; ***plus*** all the particular qualities to meet ***your*** casting needs.

See how HB&S start-to-finish quality controls save you time and money . . . help to eliminate rejects . . . guarantee you alloys always 100% "on spec."

Write TODAY for Henning's ALL-NEW "Reference Book and Guide on Zamak (Zinc Base) Die Casting Alloys." It gives valuable production and design data for die casters and engineers . . . and it's yours for the asking.



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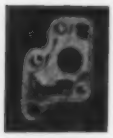

Die castings?
Dies & Machines?
Air and Odor?

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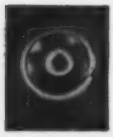

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Send for samples & technical data.

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CIRCLE 20 READERS SERVICE CARD

PEOPLE in DIE CASTING

■ **George V. Agajeenian,** formerly vice president and general manager of Univex Die Cast & Engineering Co., was elected president of the Dearborn, Michigan, firm at a recent meeting of the board of directors. He brings to his new post more than 15 years of experience in the manufacture and marketing of die castings for the automotive appliance and hardware industries.

■ John Logan, President of Ajax Magnethermic Corporation, Youngstown, Ohio, manufacturers of induction heating equipment, announces two executive appointments.

Manuel Tama has been named Vice President in charge of the Ajax Engineering Division at Trenton, New Jersey. Mr. Tama has been with the Ajax Engineering Corporation since its formation in 1941 as Vice President. He was elected President in 1958.

Melvin A. Raney has been appointed Vice President in charge of the Ajax Electrothermic Division, Trenton, New Jersey. Raney has been active in the machinery field since his graduation from Purdue University in 1934. For the past 12 years, he has been in charge of manufacturing for The Taylor-Winfield Corporation, Warren, Ohio.

Howard

Leckie-Ewing

■ **William E. Howard,** vice president of the Mellon National Bank and Trust Company, has been elected to the board of directors of Latrobe Steel Company, Latrobe, Pennsylvania. Announcement of Mr. Howard's election was made by M. W. Saxman, president of the company.

Mr. Howard has been affiliated with the Mellon organization for 27 years. He holds directorship in the Union Title Guaranty Company, Pittsburgh; Dollar Savings Bank, Pittsburgh; and Gallatin National Bank, Uniontown, Pa.

■ **Peter Leckie-Ewing** has joined the metallurgical staff of Latrobe Steel Company, Latrobe, Pennsylvania. Mr. Leckie-Ewing was formerly associated with Landis Machine Company, Waynesboro, Pennsylvania, as chief metallurgist.

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CIRCLE 22 READERS SERVICE CARD

PEOPLE

George L. Werley Research Director of New Jersey Zinc receives ASTM award

■ In recognition of his many years of service to the American Society for Testing Materials, **George L. Werley,** Research Investigator for The New Jersey Zinc Company, was given an Award of Merit at the recent Annual Meeting of the Society in Atlantic City.

Mr. Werley has served continuously as Secretary of Committee B-6 (die casting) for 21 years and is also a member of the Advisory Committee of Committee B-9 (metal powders). He is the author of numerous papers and technical articles on both zinc alloy die casting and nonferrous powder metallurgy, as well as author of sections of both ASM Metals Handbook and Kent's Engineering Handbook.

In industry, Mr. Werley is best known for his many contributions to the improvement of die casting production technology resulting from his vast knowledge of the process. He has been associated with The New Jersey Zinc Company since 1924 and is co-holder of four patents on zinc die casting alloys. In 1954 he was elected to "Who's Who in Engineering."

■ **Richard K. Schrecongost,** well known consultant in the die casting machine industry, has recently joined Greenlee Bros. & Co., Rockford, Illinois, it was announced by A. H. Eggers, President. Schrecongost will act as consultant to the B & T Machinery Company of Holland, Michigan, a subsidiary of Greenlee Bros. & Co., and will headquarter in Rockford.

A man with more than 20 years' experience in the die casting machine industry, Schrecongost has a broad background in engineering, sales manufacturing and management. Prior to coming to Greenlee's he was a consultant to the industry.

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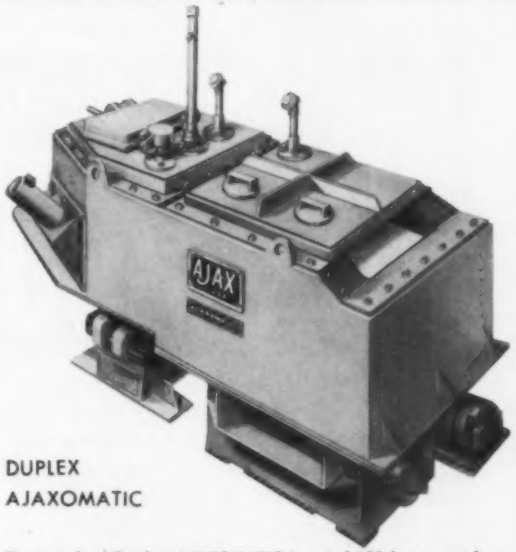
AJAXOMATICS
bring automation to die casting

The Duplex AJAXOMATIC melts aluminum pig and gates right at the die casting machine. By pushing a button the operator initiates the complete casting cycle: the die closes and the Duplex AJAXOMATIC pours the exact required amount of molten metal directly into the cold chamber. The operator just removes the finished casting at the end of the cycle.

Automation, however, is only part of the AJAXOMATIC story. The Duplex AJAXOMATIC also gives assurance of consistent quality. The quality of a finished casting begins with the proper melting of the metal. 60 cycle induction with its two basic features of internal heating and electromagnetic stirring is used exclusively in the Duplex AJAXOMATIC. Here are the unique characteristics of the Duplex AJAXOMATIC:

Precision temperature control —at low temperature	No supply ladle system or hand ladles
Alloy uniformity —no segregation	Precise weight of automatic pour
No gas porosity	Comfortable working conditions
Low metal loss	Low maintenance



DUPLEX
AJAXOMATIC

The standard Duplex AJAXOMATIC is rated 120 kw to produce 500 lbs per hour of castings ranging from ½ lb to 30 lbs. Other AJAXOMATICS are available to suit a wide range of production requirements, including units supplied from central melting systems. May we have an opportunity to study your requirements?

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AJAX ENGINEERING DIVISION
P.O. Box 308 • Union & Hancock Streets
Trenton 7, New Jersey

CIRCLE 23 READERS SERVICE CARD

Technical Literature

■ A new colorfully illustrated brochure titled "Molds for the Plastics and Die Casting Industry" is now available from **Liberty Tool & Machine Company** of Irvington, New Jersey. Liberty Tool designs, fabricates and services tools for the plastic and die casting industry. Their unit is complete and up-to-date to make injection, compression or transfer molds to serve the plastic industry.

CIRCLE 24 READERS SERVICE CARD

■ Just completed is a technical data book on the selection, application and operation of Cosmos-Rubber Contact Back-up Wheels for abrasive belt grinding and finishing. Also included in this catalog is a section on industrial rollers. The new booklet has been prepared by the **Chicago Rubber Company, Inc.,** Waukegan, Illinois.

CIRCLE 25 READERS SERVICE CARD

■ A new product bulletin on Arcosarc flux-cored electrodes and semi-automatic wire feed equipment has been issued by **Arcos Corporation,** 1500 South 50th St., Philadelphia. The four-page bulletin also serves as an instruction manual. It describes the simple, portable equipment with non-electronic controls needed for CO_2 semi-automatic and automatic welding of mild and low alloy steels. Then, by means of a picture of the unit and a diagrammatic sketch of the hook-up, it shows the process in use.

CIRCLE 26 READERS SERVICE CARD

■ Metals and products and components made of metal figure in 35 out of 40 major classifications in the 1959 Atomic Industry Directory of Products, Equipment and Services just published by the **Atomic Industrial Forum,** the association of the nuclear industry. The 132-page book provides data in depth through product and service profiles of more than 200 industrial organizations in the nuclear field. In addition to its 40 major classifications for products, equipment and services, there are 130 subcategories in the cross-index.

The directory which serves as both a buying and a marketing guide is available at $2.50 per copy from the Forum at 3 East 54th Street, New York 22, New York—Attention, Department M.

CIRCLE 27 READERS SERVICE CARD

■ A new 30 page catalog on precision mechanical finishing and automatic finishing processes is now available from the **Roto-Finish Company** of Kalamazoo, Michigan or their distributors. The catalog outlines in detail the various types of finishing and abrading processes such as grinding, deburring, descaling, and polishing. It also explains how radii can be broken and the fatigue resistance of metal parts strengthened through mass production finishing techniques. Included are illustrations and detailed descriptions of the various conventional models as well as the Roto-Matic automatic finishing machine, and the newly developed Vibratron which employs a vibratory abrasive action. Dimensions, capacities, and recommended usage of the various types of equipment are also included.

CIRCLE 28 READERS SERVICE CARD

Attention Die-Builders!

SLASH NEW DIE-CURING TIME FROM 3-WEEKS TO 3-HOURS!

NOW! Dylube #710 offers the die-caster "run-in" UNIFORMLY conditioned new die cavities. Dylube #710 provides a new coating process that's been job-proven by leading die-builders and die-casters. Conditions a green die for immediate trouble-free production; prevents undercuts; erosion; pitting; stickers and drag. Facilitates metal flow, overcomes many gating deficiencies and solder.

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CIRCLE 29 READERS SERVICE CARD

NEW BOOKS

Textbook of Physics—R. KRONIG, Editor. 961 pages. Pergamon Press, Inc., 122 East 55th Street, New York 22, New York. 1959. $15.00.

If the engineer should pose the problem of selecting out of many good and clear and useful texts on physics only one to serve him as a reference source to rely on, the TEXTBOOK OF PHYSICS offered by Pergamon Press would be a most eligible candidate for that lonely office. It is a second edition, the first of which was brought out in 1954, earning a wide respect among engineers and scientists and making necessary the second edition to meet the demand the first had created. It is, however, not a one-to-one reprint of the first edition, but rather an extension and amplification of the original, bringing the text "up-to-date" in a field where experimental techniques undergo rapid obsolescence and radical improvement as progress is accelerated by increasing demands for new know-how, more efficient than just yesterday's. For example, in the chapter on Atomic Structure, the bubble chamber and microwave spectroscopy are treated and, in the nuclear section, extensions of the discussion of pure and applied nuclear physics are noticeable. Likewise the Table of Constants at the book's end is revised, conforming to the latest known accuracies.—Robert Trochet.

Techniques of Plant Maintenance and Engineering—L. C. MORROW, Consulting Editor. 266 pages. Clapp and Poliak, Inc., 347 Madison Avenue, New York 17, New York. 1959. $10.00.

The National Plant and Engineering Conference is held each year and is part of the N.P.M.E. Show. The proceedings of the conference are valuable for their frankness of discussion where that frankness is sometimes high temperatured, throwing off sparks of brilliance as well as generating heat. This is the way with plant engineers and maintenance managers who are always under fire to get costs down, prevent shutdowns and eliminate accidents. Theirs is no easy job, you'll conclude when you read the proceedings. For frankness, heat and occasional brilliance, you'll like this book. It's the best chance you'll get this year to learn what the other guy really thinks about maintenance problems.—Robert Trochet.

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CIRCLE 30 READERS SERVICE CARD

DIE CASTING SERVICE AND PERSONNEL OPPORTUNITIES

As a service to the Die Casting Industry, we offer space in this section at $10.00 per column inch (1" x 2¼") or any fraction thereof, payable in advance.

Closing Date: 15th of month preceding publication.

To answer Box number advertisements, address responses to: Box ——, Die Casting Engineer, 19382 James Couzens Highway, Detroit 35, Michigan.

PRODUCT ENGINEER
Department Head

Plant producing automotive parts and accessories. Familiar with small assemblies of die cast components. Must be experienced in supervising from research and development and tooling through conveyorized line production. Familiarity with die casting and tooling, light machining, stamping, buffing, chrome plating and conveyorized assembly. Age limit approximately 40-50. Salary open. Applicants without specified background will not be considered. Submit resume before interview.

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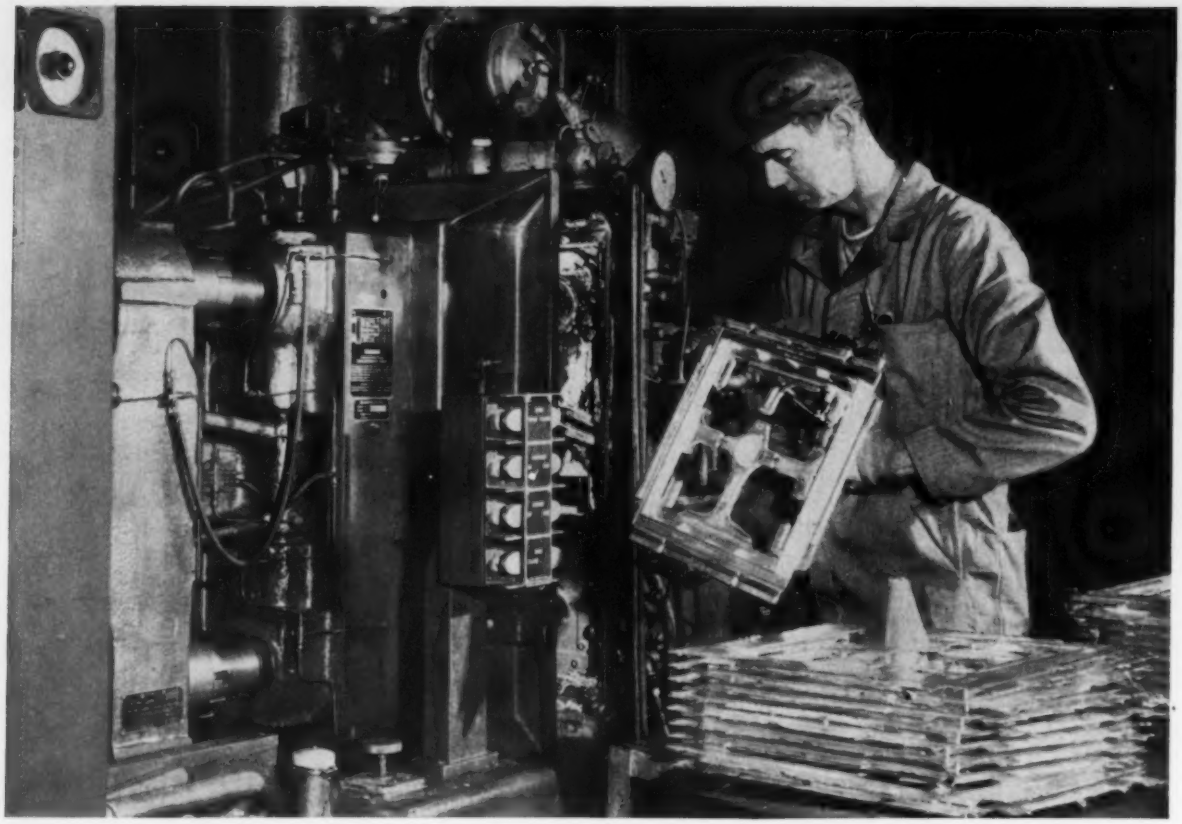
CIRCLE 31 READERS SERVICE CARD



At San Jose Die Casting

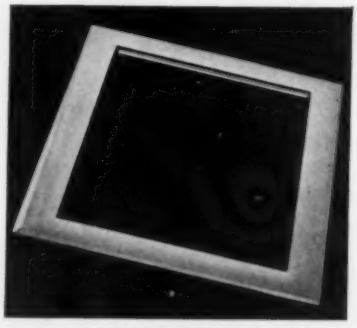
REED VACUCAST CUTS REJECT RATE BY 90%

produces higher quality, lower cost zinc castings

"I'm fully convinced that the REED Vacucast unit is a real business builder, an absolute must in assuring customers the highest quality, lowest cost zinc castings available," says William H. C. Bartlett, President of San Jose Die Casting, San Jose, California.

"Our customer, a large manufacturer of lighting fixtures, experienced a great deal of difficulty in obtaining high quality hardware finish castings. The reject rate was running well over 10%. Since we have been producing these parts on the Vacucast, rejects have been less than 1%. This has meant a considerable cost savings, since the rejects were not apparent until after the polishing and plating operations were completed. Parts now require only one buffing operation with a cotton wheel before plating. Particularly important is the absence of porosity along the trim line, which had formerly caused plating failures."

REED Vacucast gives you many advantages: thinner wall sections, improved finishes, increased cycling time, and a much lower reject rate. And the cost of adapting existing tooling to the unit is very nominal. For complete information about the REED Vacucast system call your nearest REED Sales Engineer today.



One of two lighting fixture units produced on the Reed-Prentice 1½ Zinc Vacucast Machine.

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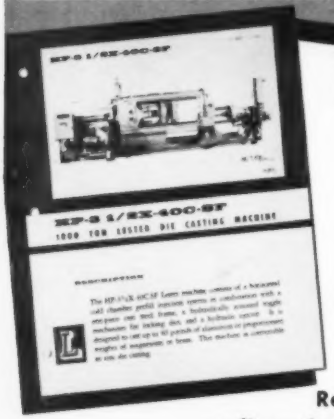

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